

REDACTED – FOR PUBLIC INSPECTION

Tamara Preiss
Vice President
Federal Regulatory Affairs



May 17, 2012

1300 I Street, NW, Suite 400 West
Washington, DC 20005

Phone 202 515-2540
Fax 202 336-7922
tamara.preiss@verizon.com

Ex Parte

VIA HAND DELIVERY

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: *Application of Cellco Partnership d/b/a Verizon Wireless and SpectrumCo, LLC for Consent to Assign Licenses and Application of Cellco Partnership d/b/a Verizon Wireless and Cox TMI Wireless, LLC for Consent to Assign Licenses, WT Docket No. 12-4*

Dear Ms. Dortch:

Cellco Partnership d/b/a Verizon Wireless herewith submits the attached *ex parte* letter. The letter contains Highly Confidential Information subject to the Second Protective Order (DA 12-51) in the above-referenced proceeding.

Pursuant to the terms of the Second Protective Order, two copies of the Redacted version of the attached letter are being filed with the Office of the Secretary. The Redacted version of the letter is also being filed electronically through the Commission's Electronic Comment Filing System. In addition, one copy of the Highly Confidential version of the letter is being delivered to the Office of the Secretary and two copies are being delivered to Ms. Sandra K. Danner of the Wireless Telecommunications Bureau's Broadband Division.

Should any questions arise concerning this filing, please do not hesitate to contact the undersigned.

Sincerely,

A handwritten signature in black ink, appearing to read "Tamara Preiss".

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Attachment

cc: Jim Bird
Sandra Danner
Paul Murray
Tom Peters
Joel Rabinovitz
Susan Singer
Ziad Sleem
Thuy Tran
Best Copy and Printing, Inc.

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Dear Ms. Dortch:

On May 15, 2012, Verizon Wireless representatives William Stone, Sanyogita Shamsunder, Jeff Stuparits, Matthew Nelson, Tamara Preiss, William Wallace, Michael Samssock, and Adam Krinsky, outside counsel to Verizon Wireless, had a telephone conversation with Tom Peters, Thuy Tran, Susan Singer, Ziad Sleem, Paul Murray, and Joel Rabinovitz of the FCC. Mr. Stone and the other representatives addressed projected capacity constraints triggered by exploding LTE traffic growth. These constraints demonstrate the need for additional spectrum to meet customers' needs, and PCS refarming alone cannot offset the growing capacity constraints.

As part of the Commission's review of the proposed license assignments, Verizon Wireless has provided extensive information and data regarding its projections for traffic growth – and resulting capacity constraints – on the 4G LTE network. The company's usage projections suggest that traffic on its LTE network will surpass data usage on its EVDO network by early

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2013. By year-end 2015, Verizon Wireless's LTE data traffic is projected to be five times the peak data traffic ever carried on the 3G EVDO network.¹

The company has explained how it incorporates traffic growth projections into network planning, and has provided data demonstrating the capacity constraints that the 4G LTE network – and Verizon Wireless customers – will experience as early as next year absent additional spectrum. The data is derived from the Verizon Planning Instrument (“VPI”), a network planning tool used in actual business practice to assess capacity constraints. Applying the VPI, Verizon Wireless has provided maps reflecting capacity constraints in markets of all sizes across the country, taking into account both the company's Upper 700 MHz C Block spectrum and its existing AWS spectrum. The data and maps confirm that Verizon Wireless will face spectrum shortages as soon as next year in some markets, absent the addition of new spectrum resources.

Mr. Stone explained that the company's data traffic growth projections incorporated into the VPI analysis and the mapping may be overly conservative. As Verizon Wireless noted previously, it has consistently underestimated growth in consumer demand, and therefore underestimated its capacity needs.² Independent, third party reports suggest far more aggressive growth rates. For example, while Verizon Wireless's 2011 mobile data traffic forecast projected a growth factor of [BEGIN HIGHLY CONFIDENTIAL] [END HIGHLY CONFIDENTIAL] for years 2011 to 2015, Cisco's 2012 mobile data traffic forecast projects a growth factor of 10.96.³ Indeed, Cisco's 2012 forecast acknowledges that “[t]he 2011 [Global] mobile data traffic growth rate was higher than anticipated,”⁴ reflecting more aggressive growth than had been anticipated. Verizon Wireless is also introducing new LTE products that may drive even more usage; for example, for the newly launched HomeFusion broadband service, average usage is trending toward [BEGIN HIGHLY CONFIDENTIAL] [END HIGHLY CONFIDENTIAL].

Since the inception of its 4G LTE network plan, the company's objective has been to provide consumers with an even better user experience on the Verizon Wireless 4G LTE network than on 3G networks (including its own). Thus, the company is committed to providing a

¹ See, e.g., Supplemental Declaration of William H. Stone, Executive Director of Network Strategy for Verizon, at ¶¶ 9, 11-17, attached as Exhibit 2 to Joint Opposition to Petitions to Deny and Comments, WT Docket No. 12-4 (filed Mar. 2, 2012) (“Stone Suppl. Decl.”).

² See Declaration of William H. Stone, Executive Director of Network Strategy for Verizon, at ¶ 10, attached as Exhibit 3 to Application of Cellco Partnership d/b/a Verizon Wireless and SpectrumCo LLC for Consent to Assign Licenses, WT Docket No. 12-4, File No. 0004993617 (filed Dec. 16, 2011).

³ See CISCO VISUAL NETWORKING INDEX (VNI) GLOBAL MOBILE DATA TRAFFIC FORECAST, 2011–2016, at 24 (Feb. 2012), http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.pdf.

⁴ *Id.* at 1.

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compelling value proposition for consumers to upgrade to the Verizon Wireless 4G LTE experience. The 4G plan began to take hold in 2008 when the company acquired the Upper 700 MHz C Block spectrum, a 10x10 MHz block. Since then, Verizon Wireless has worked with network infrastructure and device vendors to advance the LTE ecosystem, and in December 2010 the company launched the LTE network on its Upper 700 MHz C Block spectrum. It has been building ever since, and will deploy nationwide LTE by mid-2013, months ahead of the initial schedule.

Given the company's existing AWS spectrum holdings, it planned to use its AWS frequencies to support the next phase of LTE spectrum deployment – a capacity overlay – rather than look first to the heavily used PCS bands. In the last 18-24 months, Verizon Wireless has worked with vendors to develop algorithms to support load balancing between the 700 MHz and AWS spectrum; initiated service trials; and worked with device OEMs to develop equipment for the 700 MHz/AWS bands. And, planning continues to accelerate. Although Mr. Stone projected the deployment of AWS network infrastructure to [BEGIN HIGHLY CONFIDENTIAL]

[END HIGHLY CONFIDENTIAL] cell sites in [BEGIN HIGHLY CONFIDENTIAL] [END HIGHLY CONFIDENTIAL] in his March 2, 2012 Supplemental Declaration,⁵ the ongoing network planning process now projects a substantial increase in the number of cell sites equipped with AWS capability – perhaps [BEGIN HIGHLY CONFIDENTIAL] [END HIGHLY CONFIDENTIAL].

In order to bring the AWS spectrum into service on a timely basis, Verizon Wireless will need to transition customers to devices that are capable of using both its 700 MHz and AWS spectrum. In order to do that, Verizon Wireless is targeting introducing its first commercial device with 700 MHz/AWS capability in [BEGIN HIGHLY CONFIDENTIAL]

[END HIGHLY CONFIDENTIAL] and, beginning in [BEGIN HIGHLY CONFIDENTIAL] [END HIGHLY CONFIDENTIAL], plans that all new devices will have 700 MHz/AWS capability. By [BEGIN HIGHLY CONFIDENTIAL] [END HIGHLY CONFIDENTIAL], the company estimates that [BEGIN HIGHLY CONFIDENTIAL] [END HIGHLY CONFIDENTIAL] of devices on the 4G LTE network will be 700 MHz/AWS capable, with [BEGIN HIGHLY CONFIDENTIAL] [END HIGHLY CONFIDENTIAL], enabling AWS spectrum to help meet growing LTE demand.

Mr. Stone stated that PCS refarming is part of Verizon Wireless's LTE plan to help handle the further increases in traffic that will occur, but it is in addition to and not an alternative to the AWS spectrum. Robust 4G LTE operations on the PCS band will depend on device availability and penetration and on spectrum availability adequate for the Verizon Wireless LTE

⁵ See Stone Supp. Decl. ¶ 10.

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service. Mr. Stone indicated that PCS device development for the Verizon Wireless LTE network is **[BEGIN HIGHLY CONFIDENTIAL]**

[END HIGHLY CONFIDENTIAL]. He stated that, if everything falls into place, all new devices launched in **[BEGIN HIGHLY CONFIDENTIAL]** **[END HIGHLY CONFIDENTIAL]** would support LTE on 700 MHz, AWS, and PCS frequencies. Of course, by that time the LTE base will be significantly larger than today, so the rate of PCS LTE-capable device penetration will be slower – perhaps **[BEGIN HIGHLY CONFIDENTIAL]**

[END HIGHLY CONFIDENTIAL]. While he also noted that PCS refarming will be part of the company's LTE plan in **[BEGIN HIGHLY CONFIDENTIAL]**

[END HIGHLY CONFIDENTIAL], device development, certification, testing, and availability timelines could impact these projections and make them less certain than the AWS device projections discussed above. In addition, in order to avoid interference at the handset level caused by multiple air interfaces in the same band, network equipment will also need to be tested and modifications made to avoid interference between CDMA and LTE based PCS operations.

Mr. Stone also discussed why, at a minimum, a 5x5 MHz PCS block is needed to offer the mobile broadband capabilities that Verizon Wireless's customers demand and the company is committed to providing. A 5x5 MHz carrier provides an average sector throughput of 7 Mbps which, while not ideal, provides an experience in the mid-range of the LTE download speeds the company seeks to provide. By comparison, deployment on carriers smaller than 5x5 MHz does not offer the 4G value proposition Verizon Wireless seeks to provide its customers.

While LTE can be deployed on less than 10 MHz, Mr. Stone also noted that it is not an efficient way to add capacity to serve large numbers of customers using bandwidth intensive applications. This is in part due to the higher percentage of bandwidth that must be dedicated to overhead and signaling for handoff with a smaller channel. With significant bandwidth consumed for administrative needs, throughput is more limited. As a result, a 1.4x1.4 MHz channel will support an average sector throughput of 1.5 Mbps. Further, offloading traffic to such smaller channels raises issues as well. First, network vendors have developed algorithms to provide load balancing among channels (and thus better service) based on the percentage of resource blocks available within each channel. If the percentage of resource block utilization is high, the algorithm will trigger a hand off to another channel. But, with smaller blocks, overhead and signaling take up greater bandwidth, making the percentage of resource blocks available more volatile. This can create a ping pong effect, bouncing traffic from larger channels to smaller channels and forcing traffic onto smaller channels to the detriment of the user experience.

In response to an earlier inquiry from Commission staff, Mr. Stone noted that today the network **[BEGIN HIGHLY CONFIDENTIAL]**

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[END HIGHLY
CONFIDENTIAL].

As it has done in the past with voice and 3G service, Verizon Wireless has decided that its goal for 4G is to provide customers with the best user experience in the marketplace. Verizon Wireless thus plans to use 10x10 MHz carriers capable of delivering the quality of service Verizon Wireless is committed to provide. While 5x5 MHz channels may be acceptable, although not ideal, smaller channelization is not.

The parties also discussed the availability of PCS spectrum, and how Verizon Wireless's PCS spectrum depth varies from market to market. Mr. Stone explained that PCS spectrum that is available for refarming is typically in outlying areas where there is limited need for additional 3G capacity, while those same frequencies remain heavily used in the cores of urban and some rural markets. LTE and CDMA technologies cannot share the same spectrum block in proximity to one another without significant degradation. PCS spectrum cannot be used to provide LTE until all adjacent cell sites have been cleared of CDMA operations. Guard bands (by frequency) and guard zones (by geography) are thus needed to mitigate inter-technology interference.

In addition, EVDO use continues to grow. Specifically, Verizon Wireless expects its EVDO traffic to continue to grow until [BEGIN HIGHLY CONFIDENTIAL] [END HIGHLY CONFIDENTIAL] before leveling off, showing a moderate decrease in [BEGIN HIGHLY CONFIDENTIAL] [END HIGHLY CONFIDENTIAL].⁶ As a result Verizon Wireless continues to rely on its PCS spectrum to serve the capacity needs of the EVDO network. In sum, Verizon Wireless does not anticipate PCS spectrum availability and handset penetration adequate for LTE until [BEGIN HIGHLY CONFIDENTIAL] [END HIGHLY CONFIDENTIAL].⁷

Mr. Stone also explained that deployment of LTE in the PCS band will differ from deployment of CDMA in that band. With CDMA, Verizon Wireless used 1.25x1.25 MHz channel sizes, which were deployed in layers based on capacity need. With LTE, the company began deployment using 10x10 MHz carriers in the Upper 700 MHz C Band on the first day the network was operational. For the PCS band, to the extent possible, the company will also deploy wide channels for LTE.

⁶ See *Id.* ¶ 13.

⁷ See *Id.* ¶ 48.

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Verizon Wireless also discussed a series of maps attached hereto depicting LTE network capacity constraints in two markets, **[BEGIN HIGHLY CONFIDENTIAL]**

[END HIGHLY CONFIDENTIAL]. The company already provided maps for these markets that show network capacity at year-end 2013 and year-end 2015, incorporating spectrum capacity provided by the Upper 700 MHz C Block as well as the company's AWS F Block holdings that will be deployed in **[BEGIN HIGHLY CONFIDENTIAL]** **[END HIGHLY CONFIDENTIAL]**. The new maps illustrate that Verizon Wireless requires an additional 10x10 MHz of AWS spectrum, even with PCS refarming.

The first set of maps attached here, derived from the VPI, applies the same traffic growth projections as the maps previously submitted. The map set shows significant spectrum constraints in both markets by year-end 2014. The next set of maps depicts capacity constraints for these markets at year-end 2015, even accounting for PCS refarming. The maps confirm that PCS refarming alone is not adequate to protect customers from experiencing service degradation. This demonstrates once again that grant of the proposed license assignments will serve the public interest.

* * *

This letter is being filed pursuant to Section 1.1206 of the Commission's Rules. Should you have any questions, please contact the undersigned.

Sincerely,



cc: Paul Murray (redacted)
Tom Peters (redacted)
Joel Rabinovitz (redacted)
Susan Singer (redacted)
Ziad Sleem (redacted)
Thuy Tran (redacted)

LTE Traffic Projections with AWS + PCS



May 15, 2012



Projection Methodology

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